Maestro

Installation Guide

February 2005

Elmo
Motion Control

Important Notice

This guide is delivered subject to the following conditions and restrictions:

- This guide contains proprietary information belonging to Elmo Motion Control Ltd. Such information is supplied solely for the purpose of assisting users of *Maestro* motion controller.
- The text and graphics included in this manual are for the purpose of illustration and reference only. The specifications on which they are based are subject to change without notice.
- Information in this document is subject to change without notice.

Doc. No. MAN-MASIG
Copyright © 2005
Elmo Motion Control
All rights reserved

Revision History

Ver. 1.0 Feb. 2005 Preliminary Release (MAN-MASIG.pdf)

Elmo Motion Control Inc.
1 Park Drive, Suite 12
Westford, MA 01886 USA
Tel: +1 (978) 399-0034
Fax: +1 (978) 399-0035
e-mail: info-us@elmomc.com

Elmo Motion Control GmbH
Steinbeisstrasse 41
D-78056, Villingen-Schwenningen Germany
Tel: +49 (07720) 8577-60
Fax: +49 (07720) 8577-70
e-mail: info-de@elmomc.com

www.elmomc.com

Contents

Chapter 1: Safety Information 1-1
1.1 Cautions 1-2
1.2 Directives and Standards 1-2
1.3 Warranty Information 1-2

Chapter 2: Introduction 2-1
2.1 Description 2-1
2.2 Specifications 2-2
2.3 Communication Options 2-3
2.4 System Architecture 2-3
2.5 How to Use this Guide 2-4

Chapter 3: Installation 3-1
3.1 Before You Begin 3-1
3.1.1 Site Requirements 3-1
3.1.2 Working Environment 3-1
3.1.3 Hardware Requirements 3-2
3.2 Unpacking the Components 3-4
3.3 Mounting the Maestro 3-5
3.4 Connecting the Cables 3-6
3.4.1 Wiring the Maestro 3-6
3.4.2 Ethernet 3-8
3.4.3 CANopen Communication 3-9
3.5 D-Sub Cable Assemblies 3-10
3.5.1 RS-232 Communication (if needed) 3-11
3.5.2 Digital I/O Port (available mid-2005) 3-12
3.5.3 Analog Input Port (available mid-2005) 3-13
3.5.4 Encoder Port (available mid-2005) 3-14
3.6 Connecting the 24V Power Supply 3-14
3.7 Powering Up 3-15
3.8 Initializing the System 3-15

Chapter 4: Maestro Software Setup 4-1
4.1 Maestro Software Installation 4-1
4.1.1 Installing from CD-ROM 4-1
4.1.2 Downloading from the Web 4-1
4.2 Running the Composer with the Maestro 4-3
4.3 Configuring the Maestro 4-4
4.3.1 DHCP Connection 4-4
4.4 Telnet Terminal Communications 4-5
4.4.1 Pier-to-Pier Connection 4-6
4.5 Checking the Resources on the CAN Buses 4-7
4.6 Setting up the Resources 4-8
4.6.1 Axes 4-8
4.6.2 Vectors 4-8
4.6.3 Viewing the Resources 4-9
4.6.4 Downloading the Resources to the Maestro 4-9

Appendix: Technical Specifications A-1
A.1 Maestro Dimensions A-1
A.2 General Specifications A-2
A.3 Environmental Conditions A-2
A.4 Maestro Connections A-2
A.4.1 Power Supply A-4
A.5 Maestro Connectors A-4
A.5.1 Encoder Input A-4
A.6 I/O's A-5
A.6.1 Digital Input Interfaces A-5
A.6.2 Digital Output Interface A-6
A.6.3 Analog Input (J7) A-7
A.7 Communications A-8
A.8 Standards Compliance A-9
A.8.1 Quality Assurance A-9
A.8.2 Design A-9
A.8.3 Safety A-9
A.8.4 EMC A-9
A.8.5 Workmanship A-9
A.8.6 PCB A-10
A.8.7 Packing A-10

Chapter 1: Safety Information

In order to achieve the optimum, safe operation of the Maestro Multi-Axis Supervisor, it is imperative that you implement the safety procedures included in this installation guide. This information is provided to protect you and to keep your work area safe when operating the Maestro and accompanying equipment.

Please read this chapter carefully before you begin the installation process.

Before you start, ensure that all system components are connected to earth ground. Electrical safety is provided through a low-resistance earth connection.

To avoid any potential hazards that may cause severe personal injury or damage to the product during operation, keep all covers and cabinet doors shut.

The following safety symbols are used in this manual:

	Warning: This information is needed to avoid a safety hazard, which might cause bodily injury.
	Caution: This information is necessary for preventing damage to the product or to other equipment.
	Note: This is auxiliary information that ensures the correct operation of the equipment.

1.1 Cautions

	The Maestro must be connected to an approved **24VDC** power supply through a line that is separated from hazardous line voltages using reinforced or double insulation in accordance with approved safety standards.
	Before switching on the Maestro, verify that all safety precautions have been observed and that the installation procedures in this manual have been followed.

1.2 Directives and Standards

The Maestro conforms to the following industry safety standards:

Safety Standard	**Item**
In compliance with **UL60950-1** (formerly UL1950)	Safety of Information Technology Equipment, Including Electrical Business Equipment
In compliance with **EN60204-1**	Low Voltage Directive, 73/23/EEC

The Maestro has been developed, produced, tested and documented in accordance with the relevant standards. Elmo Motion Control is not responsible for any deviation from the configuration and installation described in this documentation. Furthermore, Elmo is not responsible for the performance of new measurements or ensuring that regulatory requirements are met.

1.3 Warranty Information

The products covered in this manual are warranted to be free of defects in material and workmanship and conform to the specifications stated either within this document or in the product catalog description. The Maestro is warranted for a period of 12 months from the time of installation, or 18 months from time of shipment, whichever comes first. No other warranties, expressed or implied — and including a warranty of merchantability and fitness for a particular purpose — extend beyond this warranty.

Chapter 2: Introduction

This installation guide describes the Maestro Multi-Axis Supervisor and the steps for its wiring, installation and powering up. Following these guidelines ensures maximum functionality of the system to which it is connected.

2.1 Description

Elmo's Maestro is a network-based multi-axis motion supervisor that operates in conjunction with Elmo intelligent servo drives to provide a full multi-axis motion control solution. The Maestro and the *SimplIQ* servo drives share the motion processing workload in a distributed motion control architecture.

The Maestro operates as a Multi-Axis Motion Supervisor to:

- coordinate motion between various axes in synchronized interpolated mode
- integrate event handling into motion control procedures

The Maestro operates as a CANopen Network Node Master for:

- Network management (NMT)
- Clock synchronization
- Network Configuration

The Maestro operates as a Ethernet - CAN gateway

The Maestro (with the Composer, Elmo Studio and API software) operates as a File Administrator for:

- Firmware – Maestro and intelligent drives
- Multi-Axis User Applications – Maestro and intelligent drives
- System Resources

The Maestro operates as a Multi-Axis Motion Analysis & Development tool:

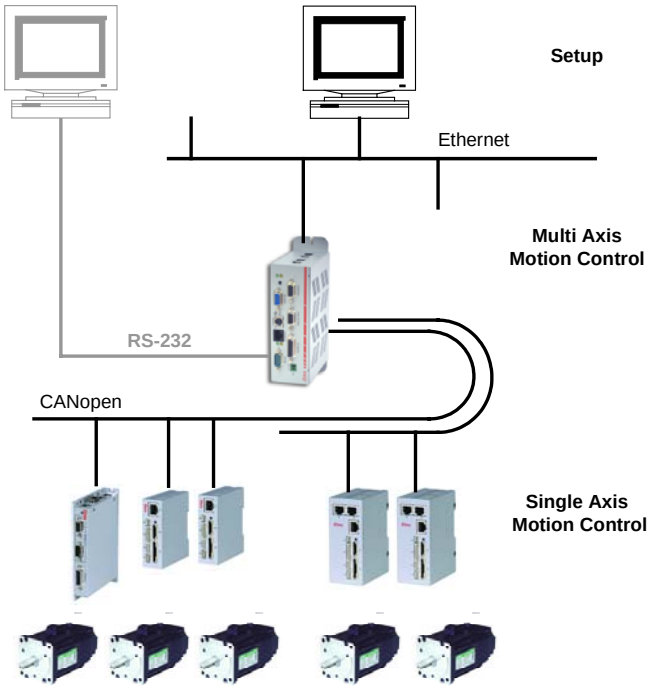
- Multi-Axis recording and analysis tools
- Multi-Axis application development environment

2.2 Specifications

Hardware:	Stand-alone
Operating System:	Real Time OS with Elmo's Kernel
Programming:	Elmo SimplIQ extended language Elmo Studio (IDE)
Debugging:	On-line monitoring of all axes state variables, get/set values, controller values, on-line axis tuning, axis variables forcing, recording
Number of Axes:	Up to 64 axes per CAN bus 2 ~ 16 Interpolated axes depending upon bus load
Axis Types:	Intelligent servo drives (Elmo) and/or CANopen DSP 402
Execution Time:	Interpolated points: 1 mSec
Axis Functions:	Standard: start/stop/reset/ reference, velocity, position Special: electronic gearings, interpolated position
Protocols:	CANopen: DS 301, DSP 401 , DSP 402 Telnet
I/O System:	On board optically isolated 8 Digital Inputs and 8 Digital Outputs 4 differential Analog Inputs Incremental encoder 40 Mega-Counts/Second
Connectivity:	Variable access via Maestro API
Master:	Heartbeat NMT Synchronization
Interface:	RS-232 Fast Ethernet (10/100 Mbps) 2 CAN bus
Power Supply:	24 VDC ±20%
Processor:	300 MHz, Pentium compatible 16 bit ISA (PC104 standard)
Memory:	64 MB Internal flash 64 MB RAM (both expandable to 128 MB)
Diagnostic LEDs:	Power, LAN Link, LAN Activity, Flash Access
Dimensions:	153 mm x 107 mm x 51 mm
Weight:	400 grams (14 ounces)
Oper. Temp.:	0°C ~ 40°C

2.3 Communication Options

The Maestro communicates with the PC through a standard RS-232 connection, through a TCP/IP network or with a direct Ethernet cable connection. It communicates with the drives by CANopen protocol.



2.4 System Architecture

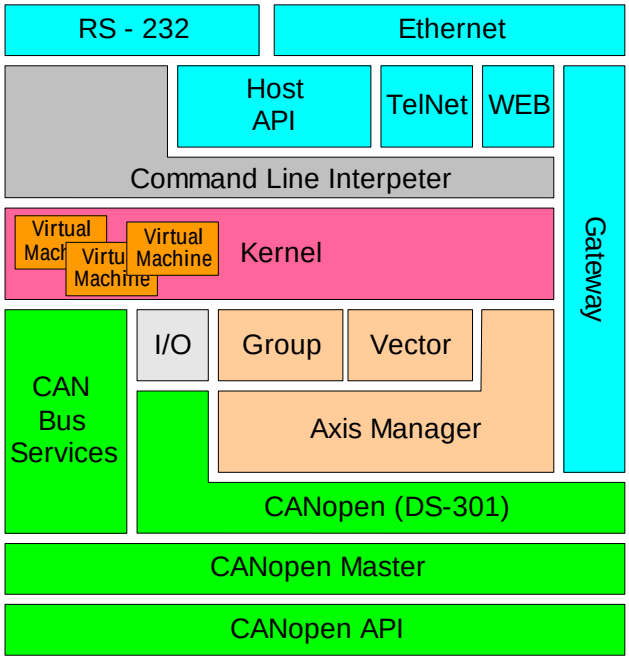


Figure 2-1 Maestro Block Diagram

The functions in the diagram are organized as follows:

Host Communications Services:
provides standard communications services

Command Line Interpreter:
enables line-by-line program execution

The Kernel:
executes programs individually or simultaneously

Motion Management:
motion is defined relative to Axes, Vectors and Groups

2.5 How to Use this Guide

This manual is part of a documentation set that, together, can be used to set up and program the motion of any machine whose motors are controlled by Elmo *SimplIQ* servo drives. When used in conjunction with the *Maestro Software Manual* it describes everything needed to get the Maestro up an running. Please read the safety instructions in the first chapter before starting.

After you have successfully mounted and installed the Maestro we suggest that you read the *Maestro Software Manual*. If you have not already done so, follow the instruction in the *Installation Guide* that arrived with your servo drive, and install a drive. At least one drive needs to be connected to the Maestro in order for it to function as a motion controller. The other manuals listed below explain how to set up and program *SimplIQ* servo drives.

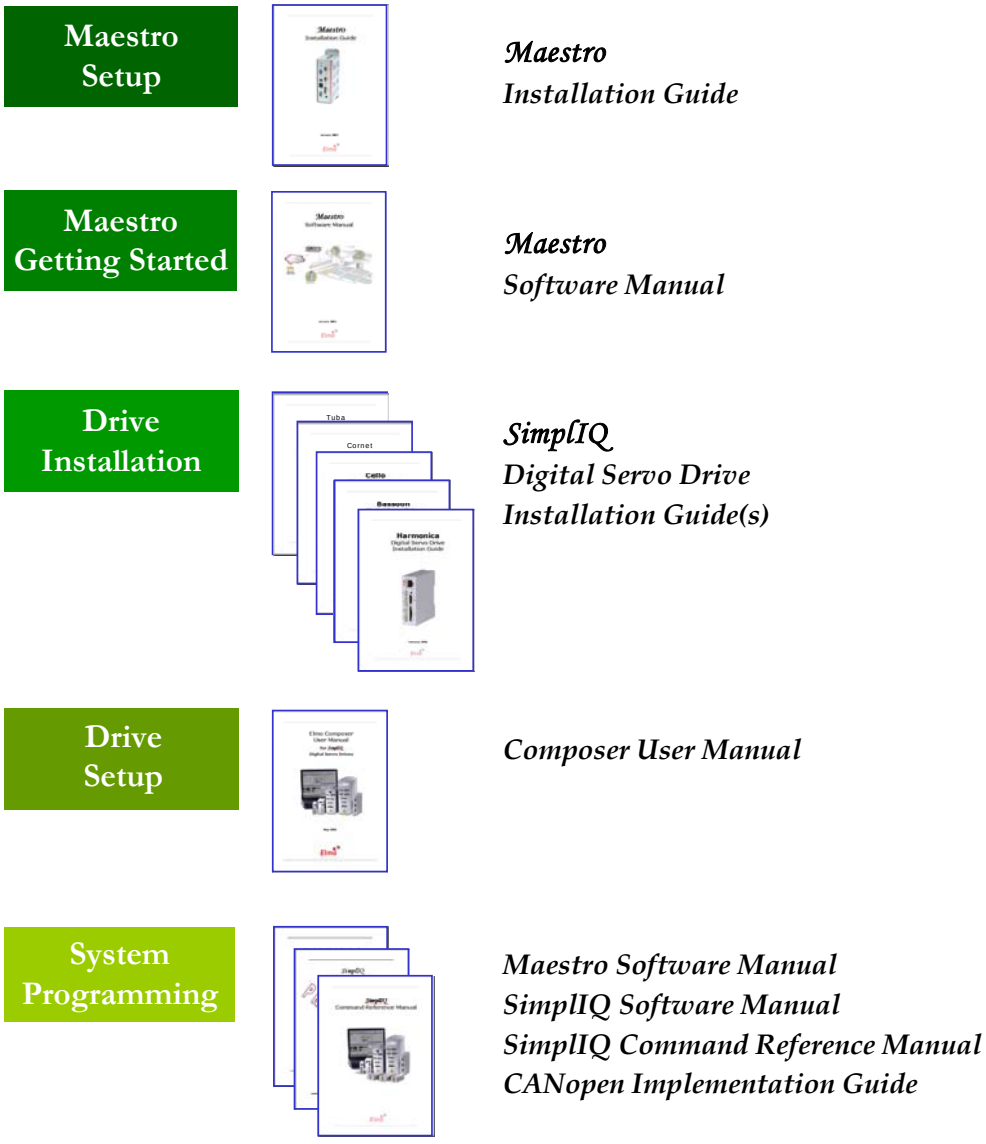


Figure 2-2: **Elmo Documentation Hierarchy**

Chapter 3: Installation

3.1 Before You Begin

3.1.1 Site Requirements

You can guarantee the safe operation of the Maestro by ensuring that it is installed in an appropriate environment.

Feature	Value
Ambient operating temperature	0° to 40°C (32° to 113°F)
Maximum relative humidity	90% non-condensing
Operating area atmosphere	No flammable gases or vapors permitted in area

3.1.2 Working Environment

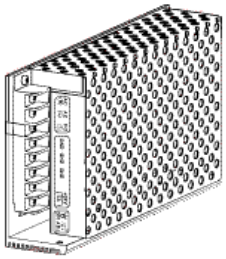
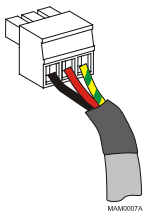
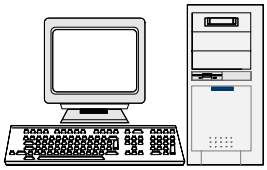
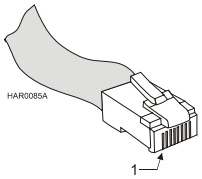
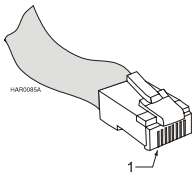
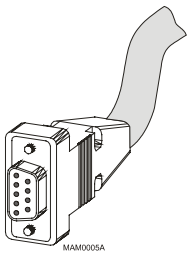
The Maestro dissipates its heat by natural convection. The maximum operating ambient temperature of 0 to 40° C (32 to 104° F) must not be exceeded.

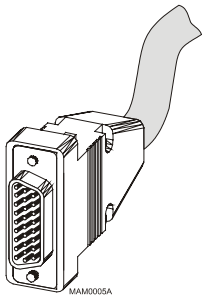
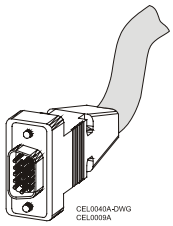
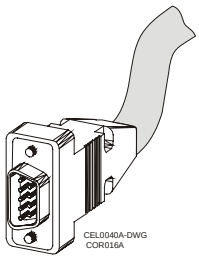
The left and right sides of the Maestro are "grated" for ventilation. Space must be provided on both sides to allow for proper ventilation and heat dissipation.

During operation the Maestro gets hot to the touch. Care should be taken when handling it.

3.1.3 Hardware Requirements

The components that you will need to install your Maestro are:

Component	Connector	Described in Section	Diagram
24VDC ±20% Power Supply	24v	3.4.2	
Power Supply Cable	24v	3.4.2	
PC for setup			
Ethernet Cable (regular or cross)	ETHERNET	3.5	
CANopen Communication cable(s)	CAN1 CAN2	3.4.3	
RS-232 Communications Cable (if needed)	RS-232		

Component	Connector	Described in Section	Diagram
Digital I/O Cable (not yet available)	DIGITAL I/O	3.5.2	
Analog Input (not yet available)	ANALOG INPUT		
Encoder (not yet available)	ENCODER		
Reserved	(6-Pin Circular mini DIN)		
Reserved	(15-Pin D-Sub Hi-Density)		

3.2 Unpacking the Components

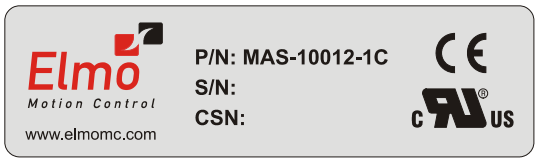
Before you begin working with the Maestro system, verify that you have all of its components, as follows:

- The Maestro Multi-Axis Supervisor
- Maestro software, either from CD or downloaded from www.elmomc.com.

The Maestro is shipped in a cardboard box with styrofoam protection.

To unpack the Maestro:

1. Carefully remove the Maestro from the box.
2. Check the Maestro to ensure that there is no visible damage to the instrument. If any damage has occurred, report it immediately to the carrier that delivered your drive.
3. To ensure that the Maestro you have unpacked is the appropriate type for your requirements, locate the part number sticker on the side of the Maestro. It looks like this:



MAM0003A

The P/N number at the top gives the type designation as follows:

MAS-10012-1C
Communications:
1C = 1 CAN Port
2C = 2 CAN Ports

4. Verify that the Maestro type is the one that you ordered.

3.3 Mounting the Maestro

The Maestro has been designed for "in-back" mounting:

- "Wall Mount" – screwed onto a panel
- DIN rail mount

M4 round head screws, one through each opening in the heat sink, are used to mount the Maestro (see the diagram below) on a wall.

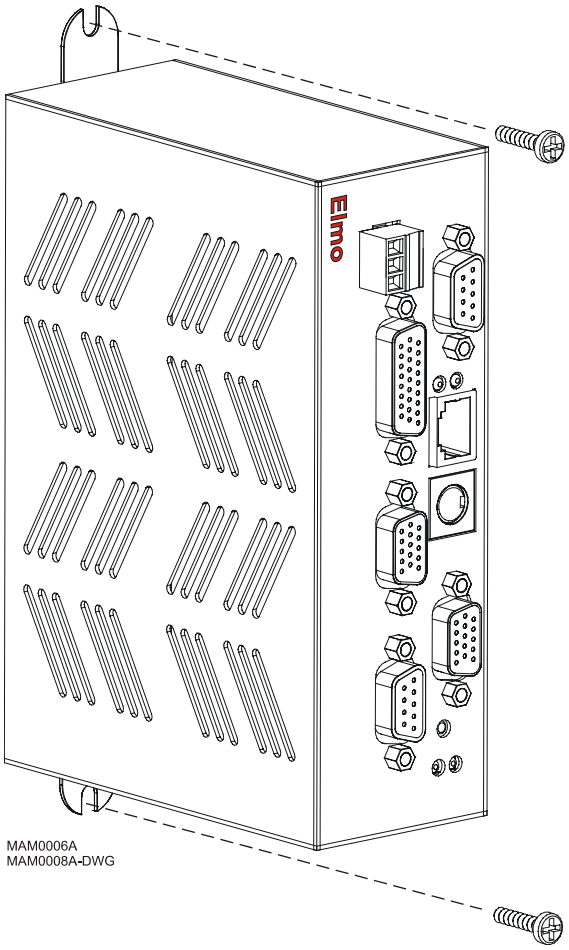


Figure 3-1: Wall Mounting the Maestro

TBD

Figure 3-2: Mounting the Maestro on a DIN Rail

3.4 Connecting the Cables

3.4.1 Wiring the Maestro

Once the Maestro is mounted, you are ready to wire the device. Proper wiring, grounding and shielding are essential for ensuring safe, immune and optimal servo performance of the Maestro.

Follow these instructions to ensure safe and proper wiring:

- Use twisted pair shielded cables for feedback and communication connections. For best results, the cable should have an aluminum foil shield covered by copper braid, and should contain a drain wire.

  The drain wire is a non-insulated wire that is in contact with parts of the cable, usually the shield. It is used to terminate the shield and as a grounding connection.
- The impedance of the wire must be as low as possible. The size of the wire must be thicker than actually required by the carrying current. A 24, 26 or 28 AWG wire for control and feedback cables is satisfactory although 24 AWG is recommended.
- Keep all wires and cables as short as possible.
- Ensure that in normal operating conditions, the shielded wires and drain *carry no current.* The only time these conductors carry current is under abnormal conditions, when electrical equipment has become a potential shock or fire hazard while conducting external EMI interferences directly to ground, in order to prevent them from affecting the drive. Failing to meet this requirement can result in drive/controller/host failure.
- After completing the wiring, carefully inspect all wires to ensure tightness, good solder joints and general safety.

The following connectors are used for wiring the Maestro.

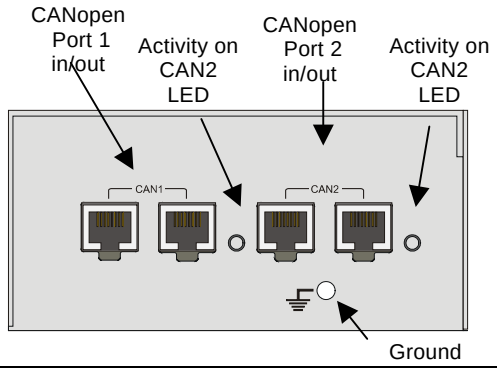
Type	Function	Port	Connector Location
8-pin RJ-45 x2	CANopen Communications	CAN1 (in/out)	
8-pin RJ-45 x2	CANopen Communications	CAN2 (in/out)	

Table 3-1: ***Connectors on the "Bottom" of the Maestro***

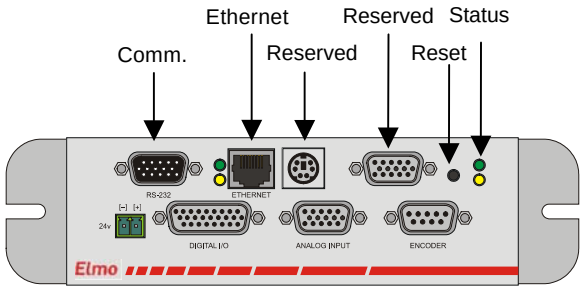
Type	Function	Port	Connector Location
9-pin D-Sub M	Comm.	RS-232	
8-pin RJ-45	Ethernet	ETHERNET	
Mini Circular 6-Pin DIN	Reserved		
15-pin D-Sub (high-density)	Reserved		

Table 3-2: ***Connectors on the "Front" of the Maestro (top row)***

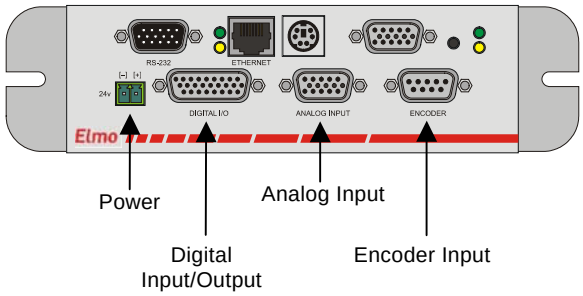
Type	Function	Port	Connector Location
2-pin power	Power Supply	24v	
28-pin D-Sub F (high density)	Input/ Output	DIGITAL I/O	
15-pin D-Sub F (high-density)	Analog Input	ANALOG INPUT	
9-pin D-Sub M	Encoder Input	(Incremental) ENCODER	

Table 3-3: ***Connectors on the "Top" of the Maestro (bottom row)***

3.4.2 Ethernet

Notes for connecting the Ethernet communication cable:

- Use a shielded Cat 5 FTP Ethernet cable.

One of two types of Ethernet cables may be needed depending on your setup:

- standard cable (used for connecting the Maestro to a PC through a hub, switch or router)
- cross cable (used for connecting a PC to the Maestro)

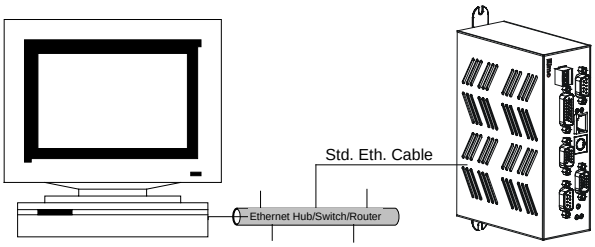


Figure 3-3 Maestro Connected to a Network

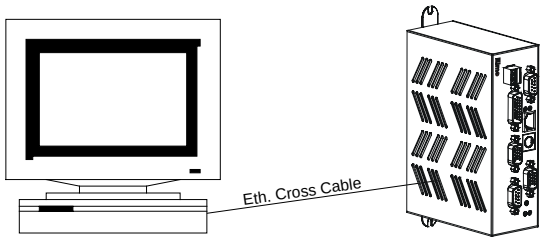


Figure 3-4 Maestro Connected Pier-to-Pier to PC

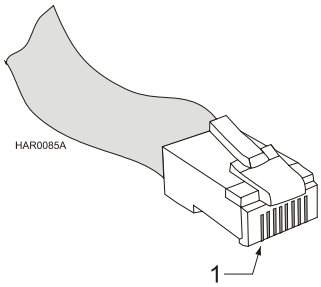
Pin	Signal	Signal	Pin	Pin Location
1	TX+	TX+	1	
2	TX-	TX-	2	
3	RX+	RX+	3	
4	–	–	4	
5	–	–	5	
6	RX-	RX-	6	
7	–	–	7	
8	–	–	8	

Table 3-4: ***Standard Ethernet Cable - Pin Assignments***

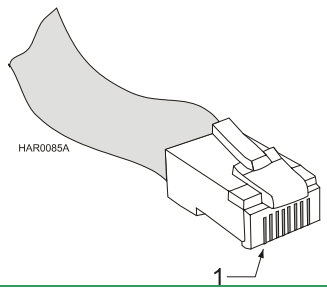
Pin	Signal	Signal	Pin	Pin Location
1	TX+	RX+	3	
2	TX-	RX-	6	
3	RX+	TX+	1	
6	RX-	TX-	2	
4,5, 7,8	–	–	4,5, 7,8	

Table 3-5: ***Ethernet Cross Cable - Pin Assignments***

3.4.3 CANopen Communication

Notes for connecting the CANopen communication cable:

- Use 26 or 28 AWG twisted pair shielded cables. For best results, the shield should have aluminum foil and covered by copper braid with a drain wire
- Connect the shield to the ground of the host (PC). Usually, this connection is soldered internally inside the connector at the PC end. You can use the drain wire to facilitate connection.
- The male RJ plug must have a shield cover.
- Ensure that the shield of the cable is connected to the shield of the RJ plug. The drain wire can be used to facilitate the connection.
  - Connect a 120-ohm termination resistor the "device end" of the network cable. (The Maestro can be used at one end of a CAN network as it has an internal termination.)

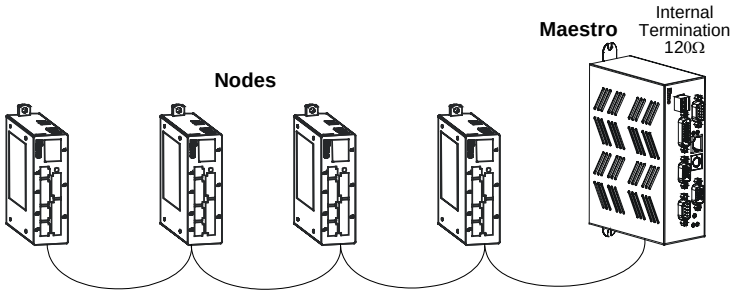


Figure 3-5 Maestro with Built-in terminator

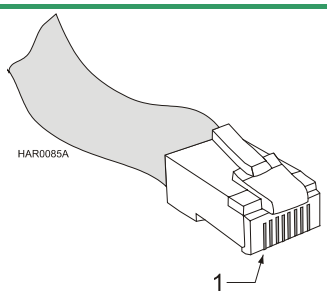
Pin	Signal	Function	Pin Position
1	CAN_H	CAN_H busline (dominant high)	
2	CAN_L	CAN_L busline (dominant low)	
3	CAN_GND	CAN ground	
4	–	–	
5	–	–	
6	CAN_SHLD	Shield, connected to the RJ plug cover	
7	CAN_GND	CAN Ground	
8	–	–	

Table 3-6: ***CANopen Cable - Pin Assignments***

3.5 D-Sub Cable Assemblies

The Maestro features easy-to-use D-sub type connections for various cables. These cables are available from Elmo. The instructions and diagrams below are designed to help customers who wish to build their own cables.

- Use 24, 26 or 28 AWG twisted-pair shielded cables (24 AWG cable is recommended). For best results, the shield should have aluminum foil covered by copper braid.
- Use only a D-sub connector with a **metal housing**.
- Attach the braid shield tightly to the metal housing of the D-type connector.
- On the device side, ground the shield.

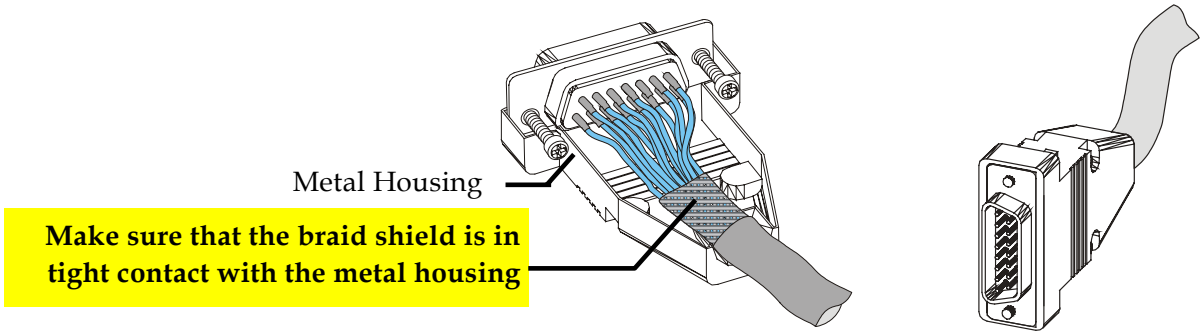


Figure 3-6: **I/O Cable Assemblies**

Note: All D-sub type connectors, used with the Maestro, should be assembled in this way.

3.5.1 RS-232 Communication (if needed)

Notes for connecting the RS-232 communication cable:

- Use a standard, commercial 3-core null-modem cable when connecting the serial port of the PC to the Maestro.
- Use a 26 or 28 AWG twisted pair shielded cable. The shield should have aluminum foil covered by copper braid with a drain wire.
- Connect the shield to the ground of the host (PC). Usually, this connection is soldered internally inside the connector at the PC end. You can use the drain wire to facilitate connection.
- The male plug must have a shield cover.
- Ensure that the shield of the cable is connected to the shield of the plug. The drain wire can be used to facilitate the connection.

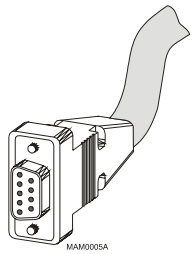
Pin	Signal	Signal	Pin	Function	Pin Location
1	–	–	1	–	 **9 pin D-sub socket**
2	–	–	2	–	
3	Tx	Rx	6	RS-232 TX to Rx	
4	–	–	4	–	
5	COMRET	COMRET	5	Communication Return	
6	Rx	Tx	3	RS-232 Rx to Tx	
7	–	–	7	–	
8	–	–	8	–	

Table 3-7: ***RS-232 Cross Cable - Pin Assignments***

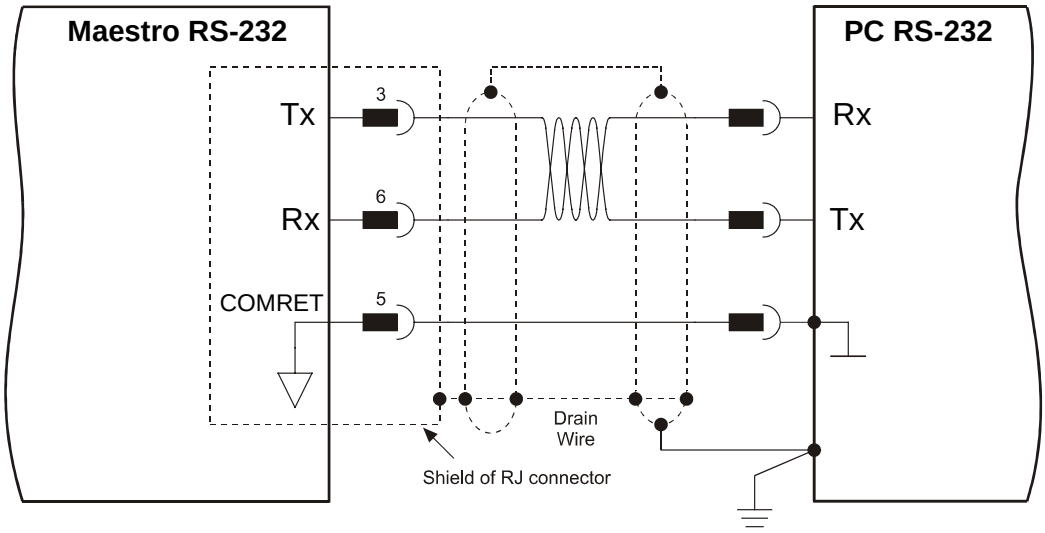


*Figure 3-7: "****Null Modem" Connection Diagram***

3.5.2 Digital I/O Port (available mid-2005)

The Digital I/O port has a 26-pin high density D-Sub socket. When assembling this I/O cable, follow the instructions in Section 3.5 (D-Sub Cable Assemblies) using a 26-pin high density metal case D-sub female connector (socket).

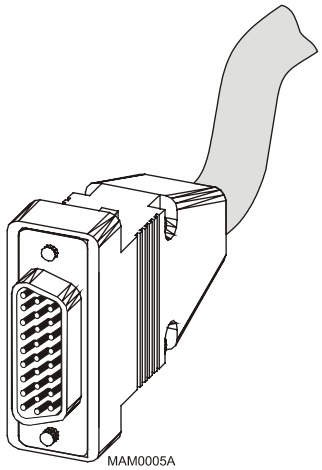
Pin	Signal	Function	Pin Position
1	IN RET1-2		
2	IN3		
3	IN4		
4	IN RET5-6		
5	IN RET7		
6	IN RET8		
7	OUT1		
8	OUT2		
9	OUT RET3-4		
10	IN1		
11	IN2		
12	IN RET3-4		
13	IN5		
14	IN6		
15	IN7		
16	IN8		
17	OUT RET1-2		
18	OUT3		
19	OUT8		
20	OUT RET8		
21	OUT7		
22	OUT RET7		
23	OUT6		
24	OUT RET5-6		
25	OUT5		
26	OUT4		

Table 3-8: ***Digital I/O Cable - Pin Assignments***

3.5.3 Analog Input Port (available mid-2005)

The Analog Input port has a 15-pin high density D-Sub socket. When assembling this I/O cable, follow the instructions in Section 3.5 (D-Sub Cable Assemblies) using a 15-pin high density metal case D-sub male connector (plug).

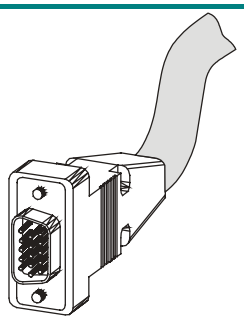
Pin	Signal	Function	Pin Position
1	IN1+		
2	IN1-		
3	IN RET		
4	NC	Not Connected	
5	NC	Not Connected	
6	IN RET		
7	IN 2-		
8	IN3+		
9	IN RET		
10	IN4-		
11	IN2+		
12	IN RET		
13	IN3-		
14	IN4+		
15	GROUND	Ground	

Table 3-9: ***Analog Input Cable - Pin Assignments***

3.5.4 Encoder Port (available mid-2005)

The Incremental Encoder port has a 9-pin high density D-Sub socket. When assembling this encoder cable, follow the instructions in Section 3.5 (D-Sub Cable Assemblies) using a 9-pin high density metal case D-sub male connector (plug).

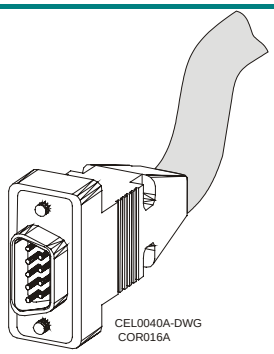
Pin	Signal	Function	Pin Position
1	A+		
2	A-		
3	B+		
4	B-		
5	IN+		
6	GROUND		
7	+5v		
8	RET GRD		
9	IN-		

Table 3-10: ***Encoder Cable - Pin Assignments***

3.6 Connecting the 24V Power Supply

The Maestro requires 30 W at 24 VDC ± 20% when turned on. Any isolated power supply that can supply that power is acceptable.

Connect the 24 VDC output from the power supply to the 24v port on the Maestro using the 3-pin power plug provided.

Notes for 24 VDC supply connections:

- Use a 24 AWG twisted pair shielded cable. The shield should have copper braid.
- The source of the 24 VDC must be isolated.
- Before applying power, first verify the polarity of the connection.

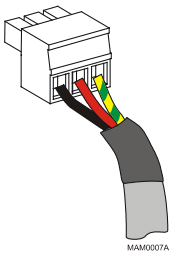
Pin	Signal	Function	Pin Position
[+]	+24VDC	+24 VDC back-up supply	
[-]	RET24VDC	Return (common) of the 24 VDC back-up supply	
⏚	PE	Ground	

Table 3-11: Power Plug

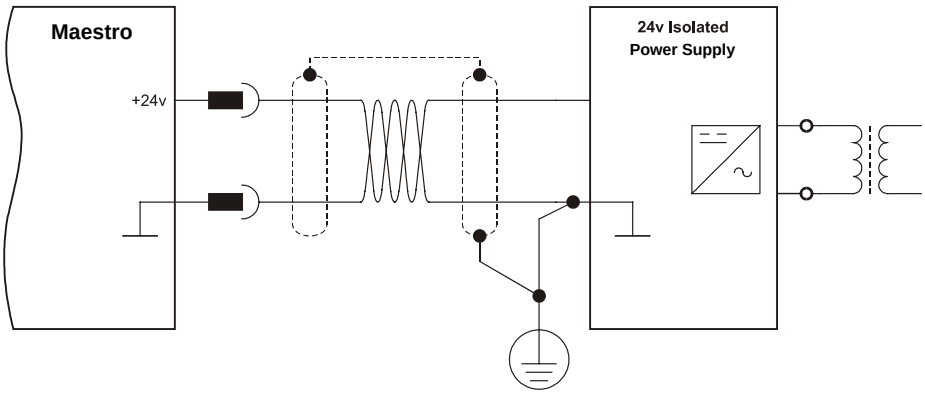


Figure 3-8: Power Supply (24v) Connection Diagram

3.7 Powering Up

After the Maestro has been mounted, check that the cables are intact. The Maestro is then ready to be powered up.

3.8 Initializing the System

After the Maestro has been connected and mounted, the system must be set up and initialized. The minimum system requirements for a setup are:

- Maestro (and power supply)
- PC (with Elmo Studio and Composer)
- At least one Drive and Motor
- Terminated CAN network

Setting up the drives and motors is described in the *Simplq Servo Drive Installation Guide* and *Composer User's Guide*. Advanced features are described in the *SimplIQ Software Manual*, *Interlude API User Guide*, *SimplIQ Command Reference* and *CANopen Implementation Guide*.

Chapter 4: Maestro Software Setup

4.1 Maestro Software Installation

Maestro software is "shrink-wrapped" with Elmo *Composer* software. Consequently, the first part of the Maestro's software setup is the installation of Elmo's Composer

You can install the *Composer* either by using the CD-ROM delivered with the Elmo servo drive or by downloading the software directly from the Elmo website.

(F:\ENG\MaestroSetup\Maestro_Composer_260105\setup.exe)

4.1.1 Installing from CD-ROM

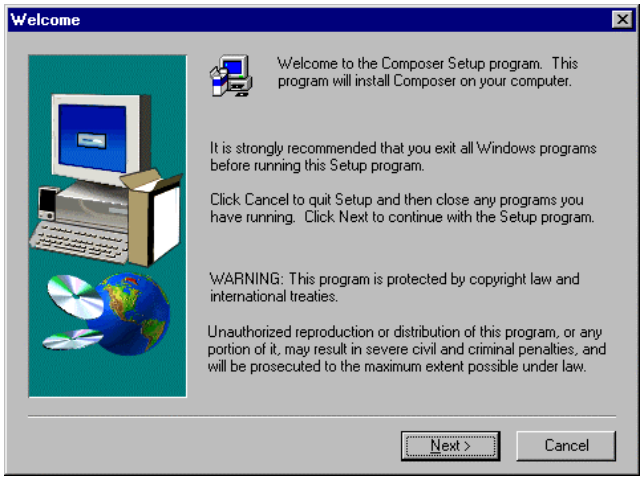
To install the Composer software from the CD-ROM to your hard drive:

1. Insert the CD-ROM into your CD-ROM drive.
2. From the Windows taskbar, select **Start - Run**. The Run dialog box will be displayed.
3. In the **Open** text box, type: **d:\setup.exe** or **e:\setup.exe**, according to the drive letter.
4. Click **OK**. The Install Wizard will be displayed.
5. Follow the Wizard instructions to install the Composer.
6. Upon completion, remove the CD-ROM from the drive.

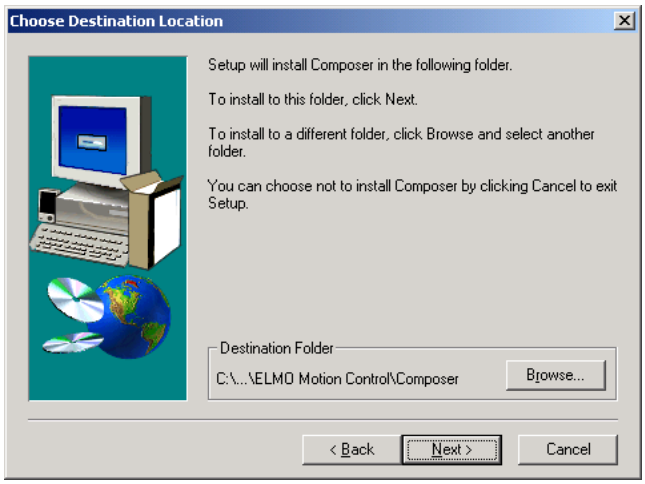
4.1.2 Downloading from the Web

To install the Composer by downloading it from the Elmo website:

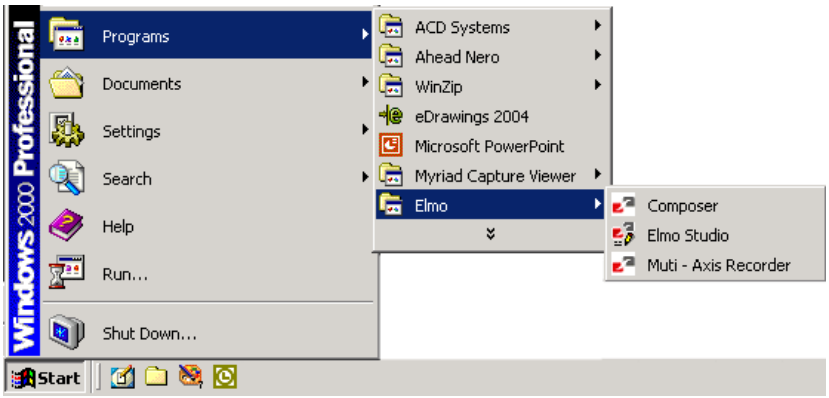
1. Using your Internet browser, go to the Elmo website: www.elmomc.com.
2. From the main menu, select **Support – Downloads**. The Support page will be displayed.
3. From the Support - Downloads menu, select **Software Tools** in the right column. The Software Tools page will be displayed.
4. From the Software Tools menu, select the **Maestro, [date]** option in the **Description** column. The Windows File Download dialog box will be displayed.
5. Select the **Save this file to disk** option and click **OK**. The Save As dialog box will be displayed.
6. Navigate to the location where the Composer application should be stored and click **Save**. The software will be downloaded to that location.
7. After the download is complete (and you click **Close**), select **Start – Run** from the Windows taskbar. The Run dialog box will be displayed.
8. Click **Browse**, navigate to the Composer folder and select the Setup.exe file. Then click **OK**. The Composer Welcome dialog box will be displayed, as follows:


Welcome
Welcome to the Composer Setup program. This program will install Composer on your computer.
It is strongly recommended that you exit all Windows programs before running this Setup program.
Click Cancel to quit Setup and then close any programs you have running. Click Next to continue with the Setup program.
WARNING: This program is protected by copyright law and international treaties.
Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.
Next >
Cancel

9. Click **Next** and follow the instructions to install the Composer.
   The Choose Destination dialog opens which enables you to pick a directory for the Composer. The default is C:\Program Files\ELMO Motion Control\Composer.


Choose Destination Location
Setup will install Composer in the following folder.
To install to this folder, click Next.
To install to a different folder, click Browse and select another folder.
You can choose not to install Composer by clicking Cancel to exit Setup.
Destination Folder
C:\...\ELMO Motion Control\Composer
Browse...
< Back
Next >
Cancel

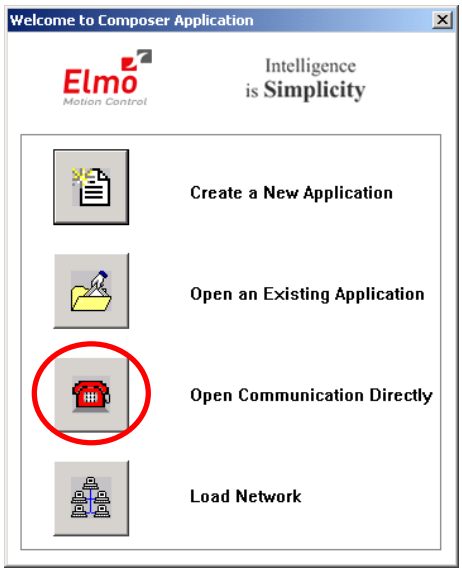
10. Upon completion of the installation, you may wish to create a desktop shortcut for fast access to the application.
11. Confirm that the installation worked by selecting *Start menu/Programs/Elmo*.

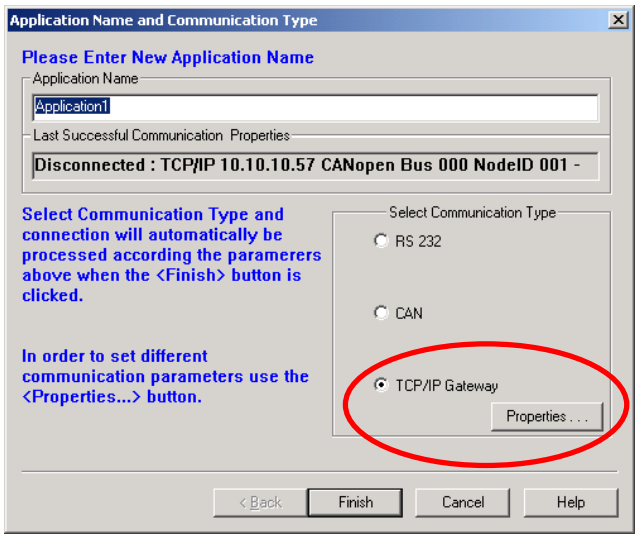


12. Open the Elmo Composer.

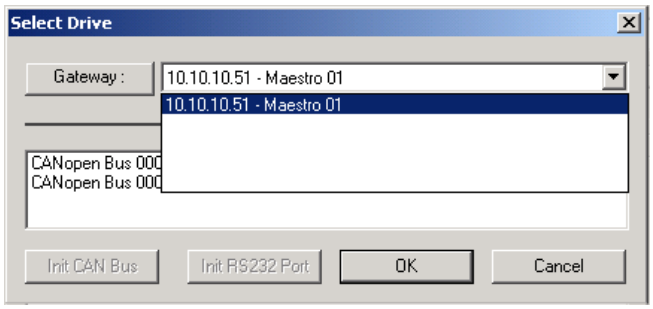
4.2 Running the Composer with the Maestro

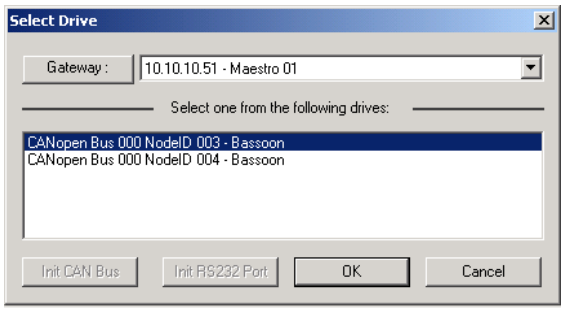
Select Start/Programs/Elmo/Composer to start Elmo's Composer and check the setup.




Application Name and Communication Type
Please Enter New Application Name
Application Name
Application1
Last Successful Communication Properties
Disconnected : TCP/IP 10.10.10.57 CANopen Bus 000 NodeID 001 -
Select Communication Type and connection will automatically be processed according the paramerers above when the <Finish> button is clicked.
In order to set different communication parameters use the <Properties...> button.
Select Communication Type
RS 232
CAN
TCP/IP Gateway
Properties . . .
< Back
Finish
Cancel
Help

1. In the Welcome menu select the *Open Communication Directly* option.
2. In the Application Name and Communication Type dialog box check the *TCP/IP Gateway* option and click the *Properties* button.
3. In the Select Drive dialog you should see at least one Maestro in the Gateway list. Select it.
4. Go to the drive window, select one of the drives and click OK to open communications with the selected drive.





5. If the Composer has no information about the device that was selected, it will upload the device info. That could take a minute or two.
6. If all is connected properly the Smart Terminal window in the Composer will open.

4.3 Configuring the Maestro

Maestro can be connected in two ways:

- Through a Network (with a DHCP server)
- Pier-to-Pier

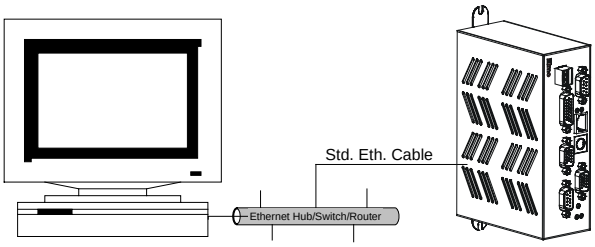


Figure 4-1 Maestro Connected to a Network

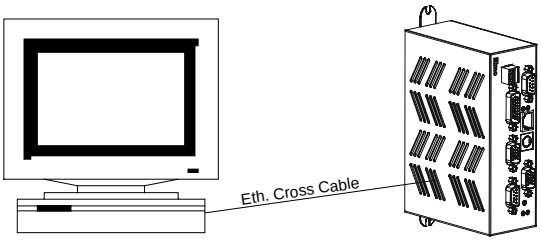
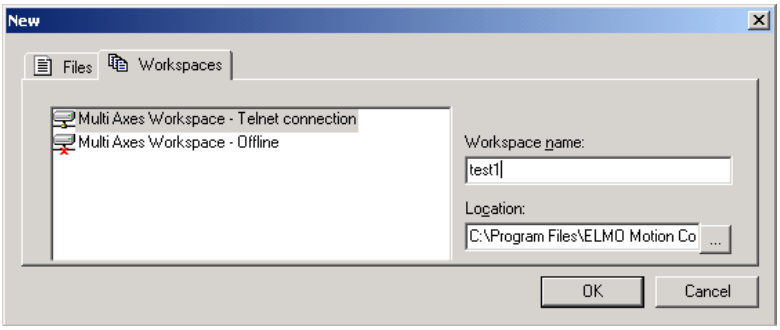


Figure 4-2 Maestro Connected Pier-to-Pier to PC

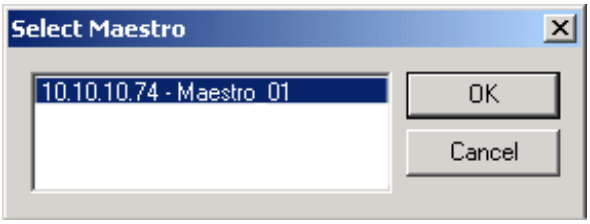
4.3.1 DHCP Connection

When the Maestro is connecting to a network with a DHCP server, its IP address is provided automatically. The Elmo Studio can be used to display that address.

To find the IP address select *File/New/Workspace* and enter a Workspace name.



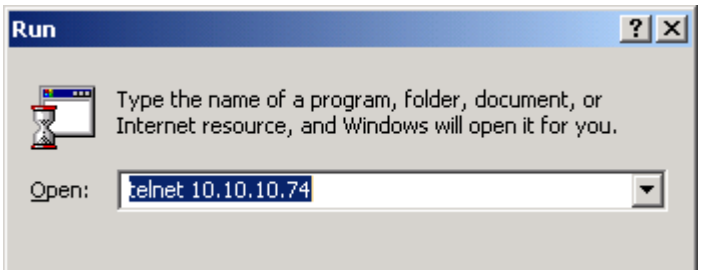
After you click OK, the IP addresses of all the Maestros on the network will be displayed.



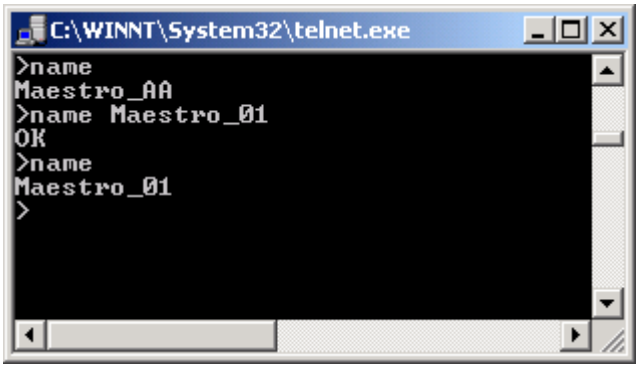
4.4 Telnet Terminal Communications

When there are several Maestros connected to the LAN it's a good idea to give each a unique name. This is done through a Telnet connection as follows:

1. Select Start/Run in Windows.
2. Type *Telnet* and the I.P. address in the Open dialog.

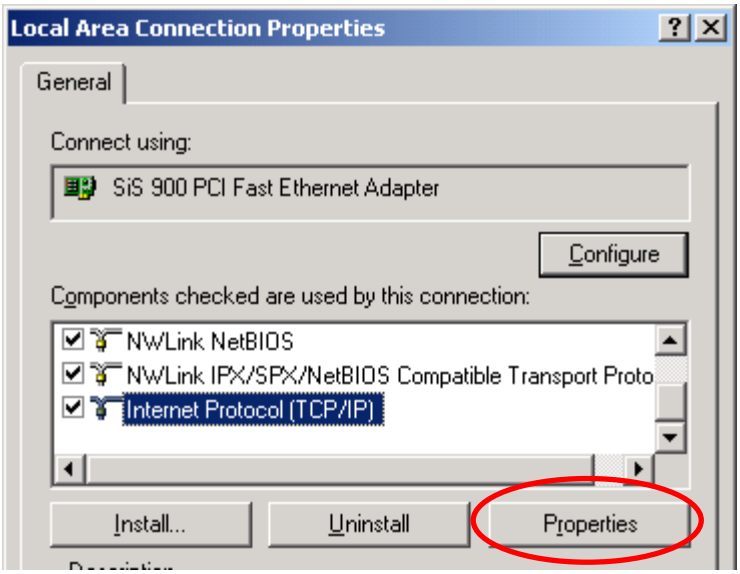

Run
Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.
Open:
telnet 10.10.10.74

3. Type *name* to see the current name of the Maestro at that address.
4. Type *name* followed by your name of choice.
5. Type *name* again to confirm that your name has been applied.

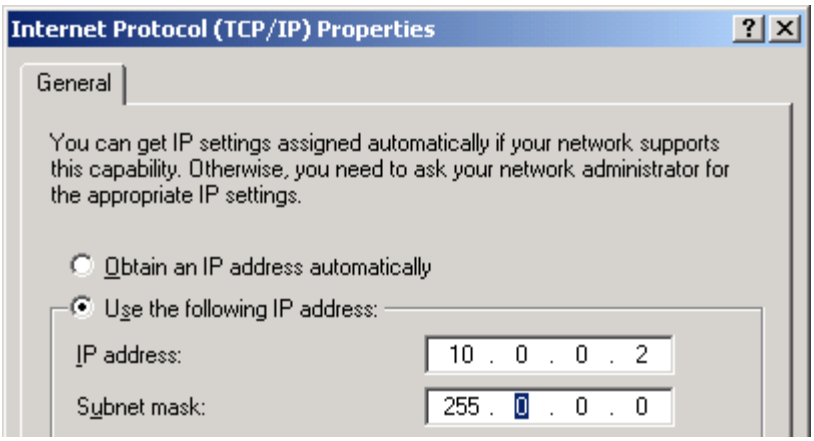


4.4.1 Pier-to-Pier Connection

When connecting a Maestro directly to a PC, select *Start/Settings/Control Panel* to open the Control Panel and then select *Network and Dial-up Connections/Local Area Connection/Properties* to set the IP address of the Maestro manually.



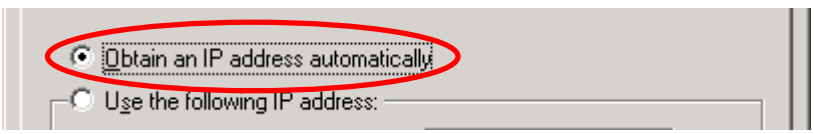
In the Internet Protocol Properties menu select the *Use the following IP address* option and enter 10.0.0.2 for the IP address and 255.0.0.0 for the Subnet mask.


Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
10 . 0 . 0 . 2
Subnet mask:
255 . 0 . 0 . 0

Select OK in the Internet Protocol Properties dialog, and OK in the *Local Area Connection Properties box*.

Maestro's delivered from the factory have an IP Address of 10.0.0.56 and Subnet Mask of 255.0.0.0. After communications have been established, the IP address can be changed with the help of the command interpreter.

To reconnect the PC to the network, reset the Internet Protocol Properties to *Obtain an IP address automatically*.



4.5 Checking the Resources on the CAN Buses

Once you have established communications with the Maestro you can use the Elmo Studio to check what devices are connected. This is done by opening the Resource View, selecting a CAN Bus, **clicking the right mouse button** and selecting *Update CAN Bus Info*. Sample results are shown below:

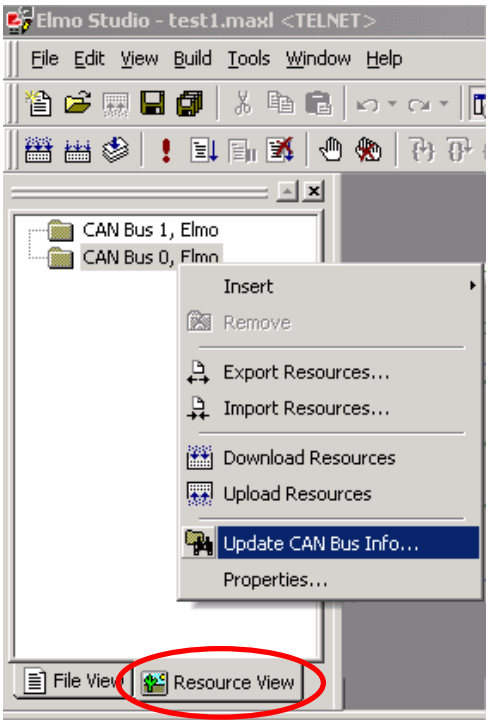
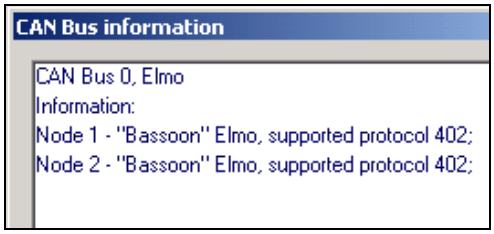


Figure 4-3 Selecting a Bus to View

CAN 0 (Has 2 Nodes)


CAN Bus information
CAN Bus 0, Elmo
Information:
Node 1 - "Bassoon" Elmo, supported protocol 402;
Node 2 - "Bassoon" Elmo, supported protocol 402;

CAN 1 (Nothing connected)

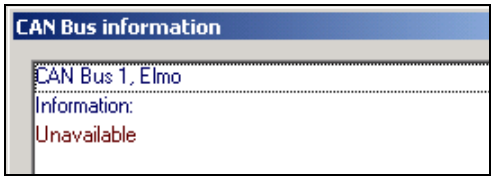


Figure 4-4 Viewing Bus Info

Some menu options can only be reached by highlighting a resource and clicking on the right mouse button. In the case above, this prevents inadvertent programming of the wrong CAN bus.

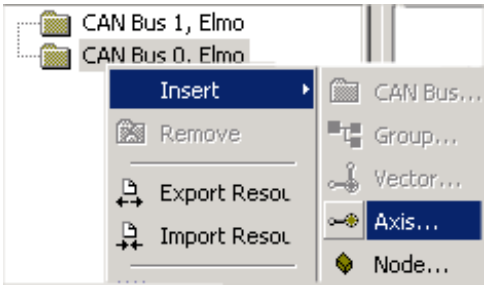
4.6 Setting up the Resources

Once the Maestro knows what devices are on the CAN bus, you can set them up. The first step is to name the resources.

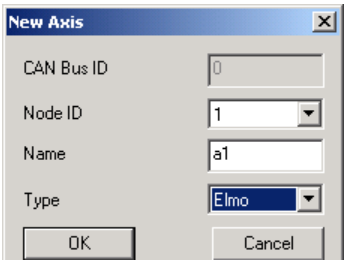
4.6.1 Axes

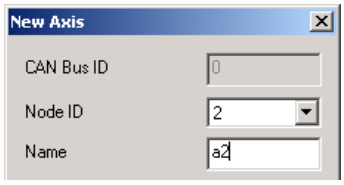
The axes are set up as follows:

1. Select a CAN bus.
2. Click the right mouse button.
3. Select *Insert*.
4. Select *Axis*.



5. Select a Node (Node ID).
6. Give the node a name (such as Axis_1 or a1)
7. Select a Type (Elmo Drive or DS402).
8. Click OK
9. Repeat for each of the other axes.

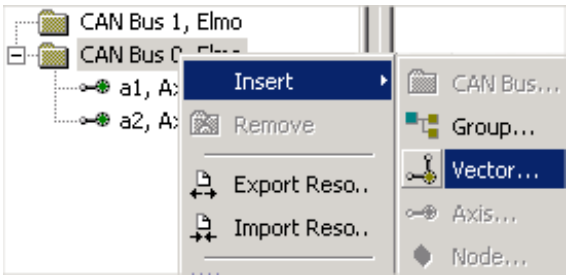




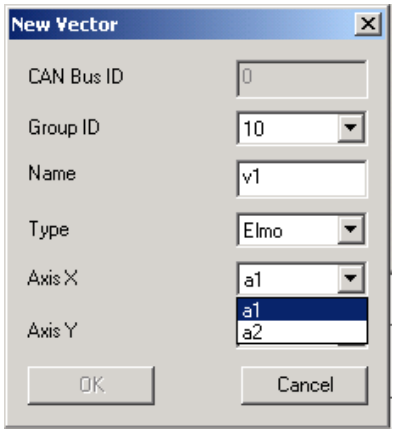
4.6.2 Vectors

The vectors are set up as follows:

1. Select a CAN bus.
2. Click the right mouse button.
3. Select *Insert*.
4. Select *Vector*.

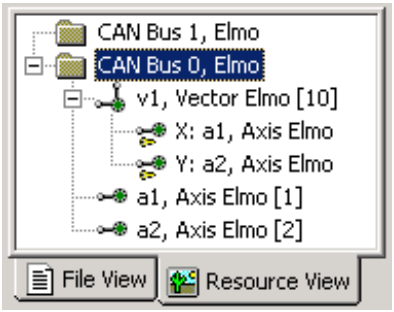


10. Select a Node (Node ID).
11. Give the vector a name (such as v1)
12. Select a Type (Elmo Drive or DS402).
13. Select the axes that create the vector.
14. Click OK
15. Repeat for each of the other axes.



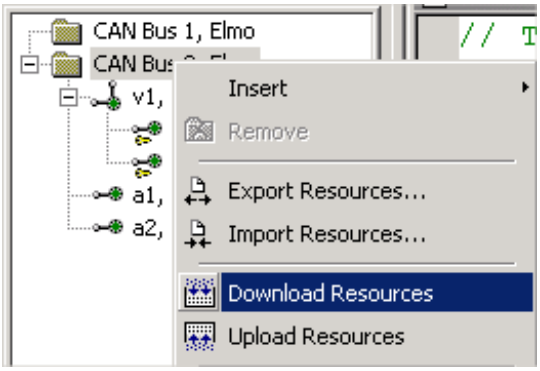
4.6.3 Viewing the Resources

Once the Axes and vectors have been set up, it is a good idea to check them. This is done by expanding the CAN Bus in the Resource View.



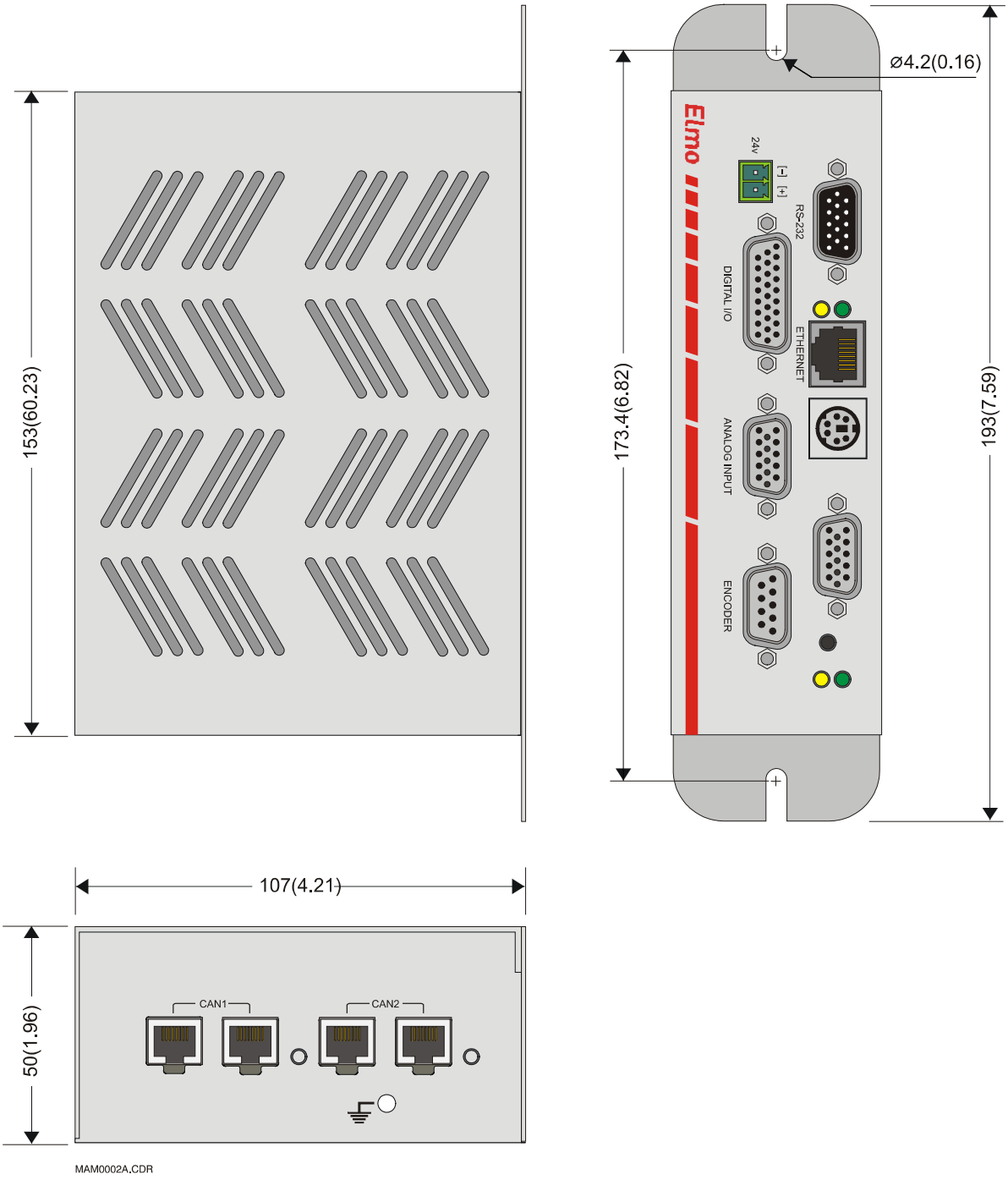
4.6.4 Downloading the Resources to the Maestro

When all the resources have been set up, they must be downloaded to the Maestro. The setup is downloaded by clicking the right mouse button and selecting *Download Resources*.



Appendix: Technical Specifications

A.1 Maestro Dimensions



A.2 General Specifications

Weight	350 grams (12.3 ounces)
Dimensions	105 x 44 X 76 mm (4.1″ x1.7″ x 3.0″)
Mounting Method (with adapter)	Wall Mount (“Bookshelf”) or DIN Rail
Digital In / Digital Out / Analog In	6 / 2 / 1

A.3 Environmental Conditions

Feature	**Details**
Operating ambient temperature	0° ~ 40° C (32° ~ 104° F)
Storage temperature	-20° ~ +85° C (-4° ~ +185° F)
Humidity	90% maximum non-condensing
Protection level	IP20

A.4 Maestro Connections

The following connectors are used for wiring the Maestro.

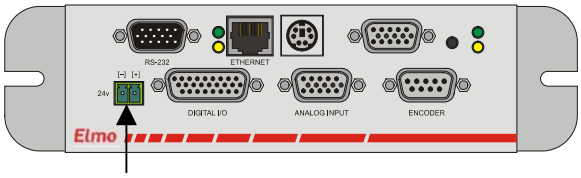
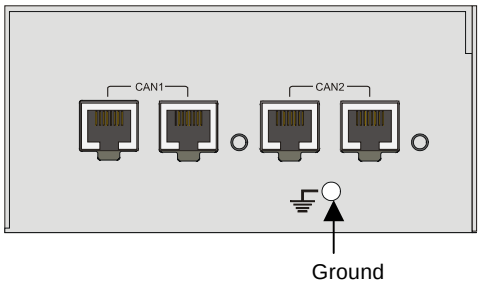
Pins	**Type**	**Maker & Part No.**	**Mating Connector**	**Port**
2	3.81 mm Pitch Header and Plug	Pheonix Header MC 1.5/2-G-3.81	Pheonix Plug (supplied) MC 1.5/2-ST-3.81	24v
				

Table A-1: ***Maestro Power and Ground Connectors***

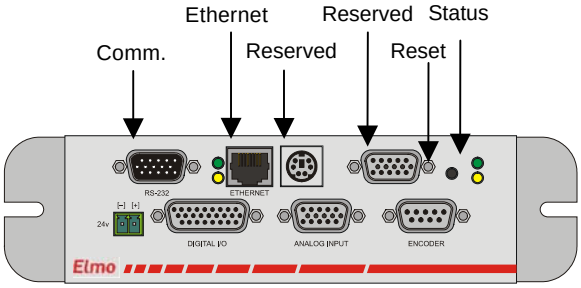
Pins	Type	Port	Connector Location
9	D-Sub M	**RS-232**	
8	RJ-45	**ETHERNET**	
6	Mini DIN Circular	Reserved	
15	D-Sub (high-density)	Reserved	

Table A-2: ***Connectors on the "Front" of the Maestro (top row)***

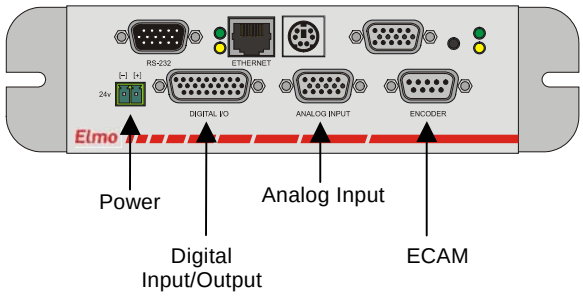
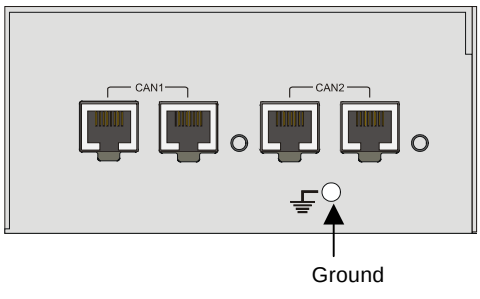
Pins	Type	Port	Connector Location
28	D-Sub F (high density)	**DIGITAL I/O**	
15	D-Sub F (high-density)	**ANALOG INPUT**	
9	D-Sub M	**ENCODER**	

Table A-3: ***Connectors on the "Top" of the Maestro (bottom row)***

Pins	Type	Port	Connector Location
8	RJ-45	**CAN1**	
8	RJ-45	**CAN1**	
8	RJ-45	**CAN2**	
8	RJ-45	**CAN2**	

A.4.1 Power Supply

Feature	Details
Auxiliary power supply	*DC source only*
Auxiliary supply input voltage	24 V ±20%
Auxiliary supply input power	30 W

The Cello can operate without a 24 Volt back-up power supply

A.5 Maestro Connectors

A.5.1 Encoder Input

Feature	Details
Encoder output format:	
Interface	TBD
Output current capability	
Available at options	
Maximum frequency	
Edge separation between A & B	
Index (marker):	

A.6 I/O's

The Bassoon has: 8 Digital Inputs 8 Digital Outputs 4 Analog Input

A.6.1 Digital Input Interfaces

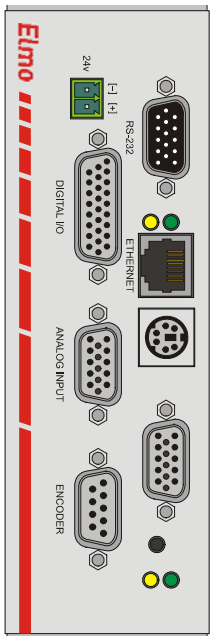
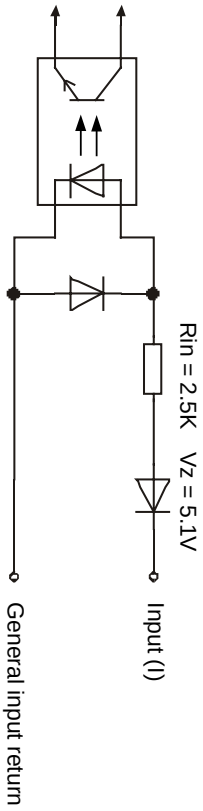
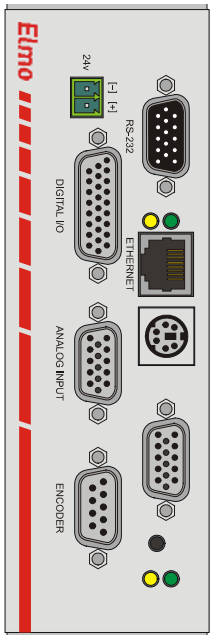
Feature	Details	Connector Location
Type of input		
Input current		
Input current for high speed inputs		
High-level input voltage		
Low-level input voltage		
Minimum pulse width	TBD	
Execution time (all inputs): the time from application of voltage on input until execution is complete		
High-speed inputs - minimum pulse width, in high-speed mode		

Figure A-1: Digital Input Schematic

A.6.2 Digital Output Interface

Feature	Details	Connector Location
Type of output		
Maximum supply output (Vcc)		
Maximum output current Io (max) (Vout = Low)	TBD	
VOL @ maximum output voltage (low level)		
RL		
Executable time		

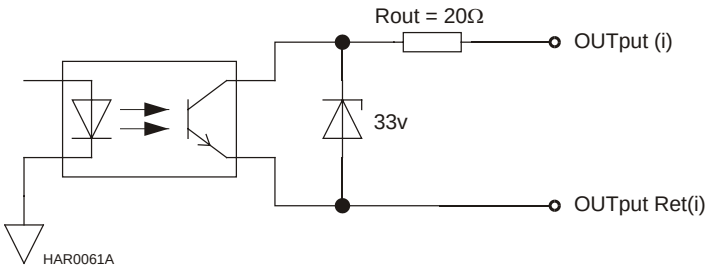
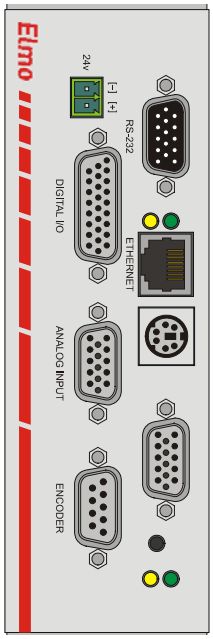
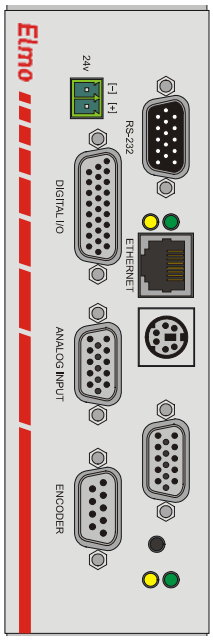
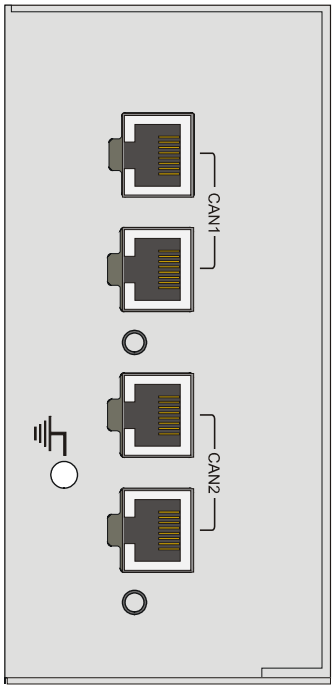


Figure A-2: Digital Output Schematic

A.6.3 Analog Input (J7)

Feature	Details	Connector Location
Maximum operating differential mode voltage	TBD	
Maximum absolute differential input voltage		
Differential input resistance		
Analog input command resolution		

A.7 Communications

Specification	Details	Connector Location
Ethernet	**0ne 10/100 Base-T Ethernet**	
RS-232	**Signals:** ▪ RxD , TxD , Gnd Baud Rate of 9,600 ~ **115,200** bits/sec.	
CANopen	**CANbus Signals:** ▪ CAN_H, CAN_L, CAN_GND ▪ Maximum Baud Rate of 1 Mbits/sec. **Version:** ▪ DS 301 V4.01 **Device Profile** (drive and motion control)**:** ▪ DSP 402	

A.8 Standards Compliance

A.8.1 Quality Assurance

Specification	Details
ISO 9001:2000	Quality Management

A.8.2 Design

Specification	Details
MIL-HDBK- 217F	Reliability prediction of electronic equipment (rating, de-rating, stress, etc.)
▪ **IPC-D-275** ▪ **IPC-SM-782** ▪ **IPC-CM-770** ▪ **UL508c** ▪ **UL840**	Printed wiring for electronic equipment (clearance, creepage, spacing, conductors sizing, etc.)
In compliance with **IEC68**	Type testing

A.8.3 Safety

Specification	Details
In compliance with **UL60950**	Safety of information technology equipment, including electrical business equipment
In compliance with **EN60204-1**	Low voltage directive, 73/23/EEC

A.8.4 EMC

Specification	Details
In compliance with EN55011 Class A with EN61000-6-2: Immunity for industrial environment, according to: IEC61000-4-2 / criteria B IEC61000-4-3 / criteria A IEC61000-4-4 / criteria B IEC61000-4-5 / criteria B IEC61000-4-6 / criteria A IEC61000-4-8 / criteria A IEC61000-4-11 / criteria B/C	Electromagnetic compatibility (EMC)

A.8.5 Workmanship

Specification	Details
In compliance with **IPC-A-610**, level 2	Acceptability of electronic assemblies

A.8.6 PCB

Specification	Details
In compliance with **IPC-A-600**, level 2	Acceptability of printed circuit boards

A.8.7 Packing

Specification	Details
In compliance with **EN100015**	Protection of electrostatic sensitive devices